

Operating Instructions for Compact Vortex Flow Meter

Model: DVZ



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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

as per PED 2014/68/EU

In acc. with Article 4, Paragraph (3), "Sound Engineering Practice", of the PED 2014/68/EU no CE mark.

Diagram 8, Pipelines, Group 1, dangerous fluids

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.

Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:

The standard delivery includes:

- Compact Vortex Flow Meter model: DVZ
- Operating Instructions

4. Regulation Use

Any use of the Compact Vortex flow meter, model: DVZ, which exceeds the manufacturer's specifications, may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

5. Operating Principle

The compact KOBOLD Vortex flow meter, model DVZ, is used for measuring and monitoring smaller and medium-sized flow of low viscosity, water-like fluids in pipes.

The device works using the vortex process, making it virtually maintenance-free. This involves the installation of a sharp-edged object (the vortex generator) in the flow duct. A vortex is created behind the object whose frequency is proportional to the flow velocity of the fluid.

The flow volume can be determined with a very great degree of accuracy by measuring the vortex frequency. This achieves a very high linearity across the whole measuring range.

The device can be fitted with switching, frequency or analogue outputs. There is also an optional compact electronics package that includes a digital display, and both a switching and analogue output.

6. Mechanical Connection

6.1 Check operating conditions:

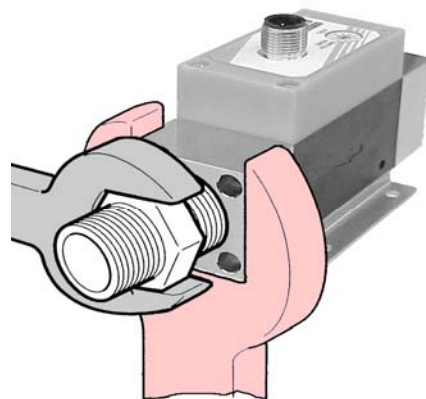
- Flow rate
- max. operating pressure
- max. operating temperature

6.2 Installation

- Remove all packing materials and transport retainers and ensure that no such materials remain in the device.
- Install with flow in direction of arrow (universal mounting)
- Avoid pressure and radial tension
- Fasten the pipe at up stream and down stream at a distance of 50 mm from the connections



Attention! Retransfer the unit on the metal bolting (not on the plastic housing!) Mount switches using the proper tightening torque according the following table!



Nominal size of threads	Proper tightening torque
3/8"	22 bis 24 Nm
1/2"	28 bis 30 Nm
3/4"	28 bis 30 Nm
1"	36 bis 38 Nm



Note! The switch may be damaged if it is tightened above the tightening torque range. Also, if it is tightened below the tightening torque range, the connecting thread section may loosen.

- Ensure inlet section of 10xDN and outlet section of 10xDN
- Avoid valves or large reduction on the inlet section (this increases the inaccuracy of measurements)
- Check the seals of the connections



Attention! When used with an open output side, there is a danger of cavitation.

7. Electrical Connection

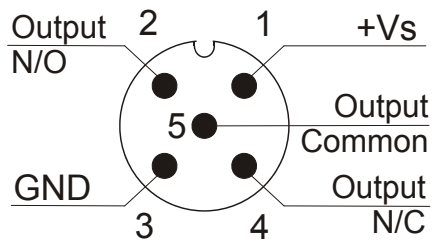
7.1 General



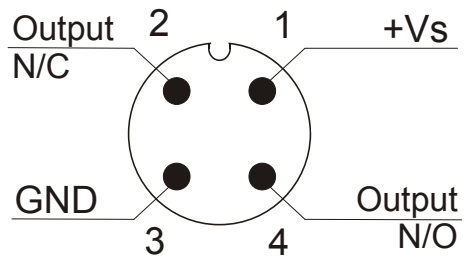
Attention! Make sure that the voltage values of your system correspond with the voltage values of the measuring unit.

- Make sure that the supply wires are de-energised.
- Connect the supply voltage and the output signal **to the plug PIN's as stated below.**
- We recommend the use of wires with cross sectional area of min. 0,25 mm².

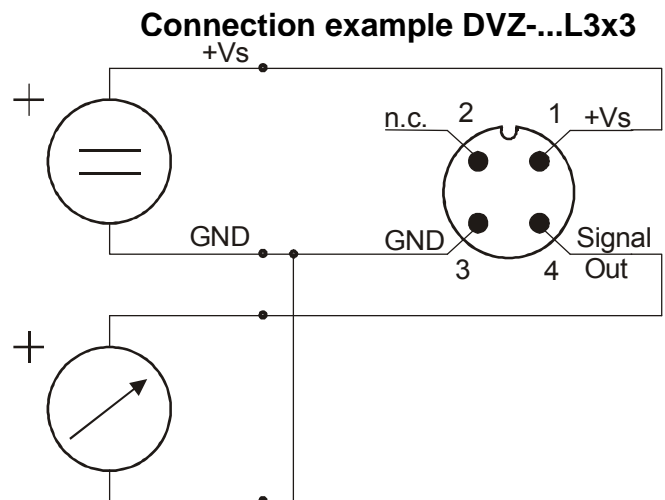
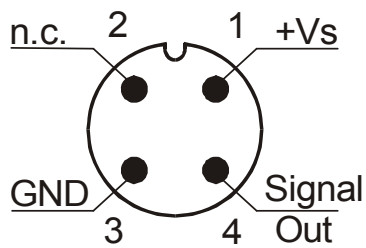
7.2 DVZ-...S300



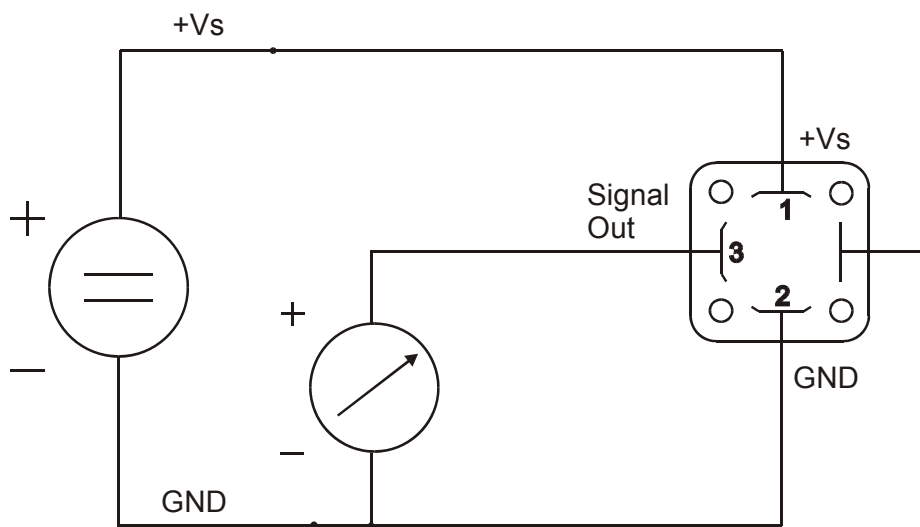
7.3 DVZ-...S30D



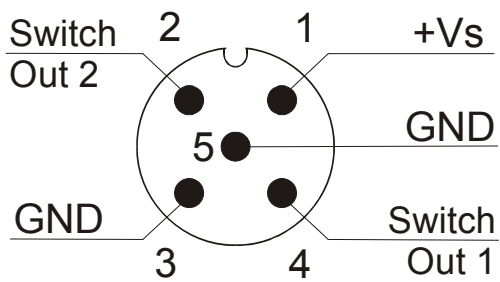
7.4 DVZ-...F300; DVZ-...L3x3



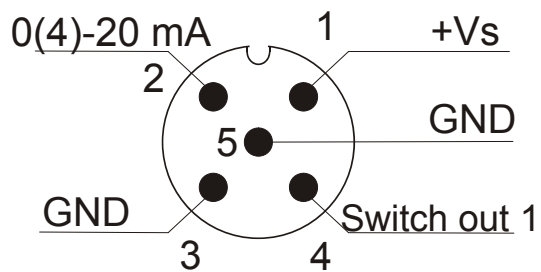
7.5 DVZ-...L443



7.6 DVZ-...C30



7.7 DVZ-...C34



7.8 DVZ-...Ex4R, DVZ-...Gx4R

Cable connection

Wire number	DVZ-...E14R Counter electronics	DVZ-...G14R Dosing electronics
1	+24 V _{DC}	+24 V _{DC}
2	GND	GND
3	4-20 mA	4-20 mA
4	GND	GND
5	n. c.	control 2*
6	reset part quantity	control 1*
7	relay S1	relay S1
8	normally open	normally open
9	relay S2	relay S2
10	normally open	normally open

*Start-dosing: Control 1 connect with GND

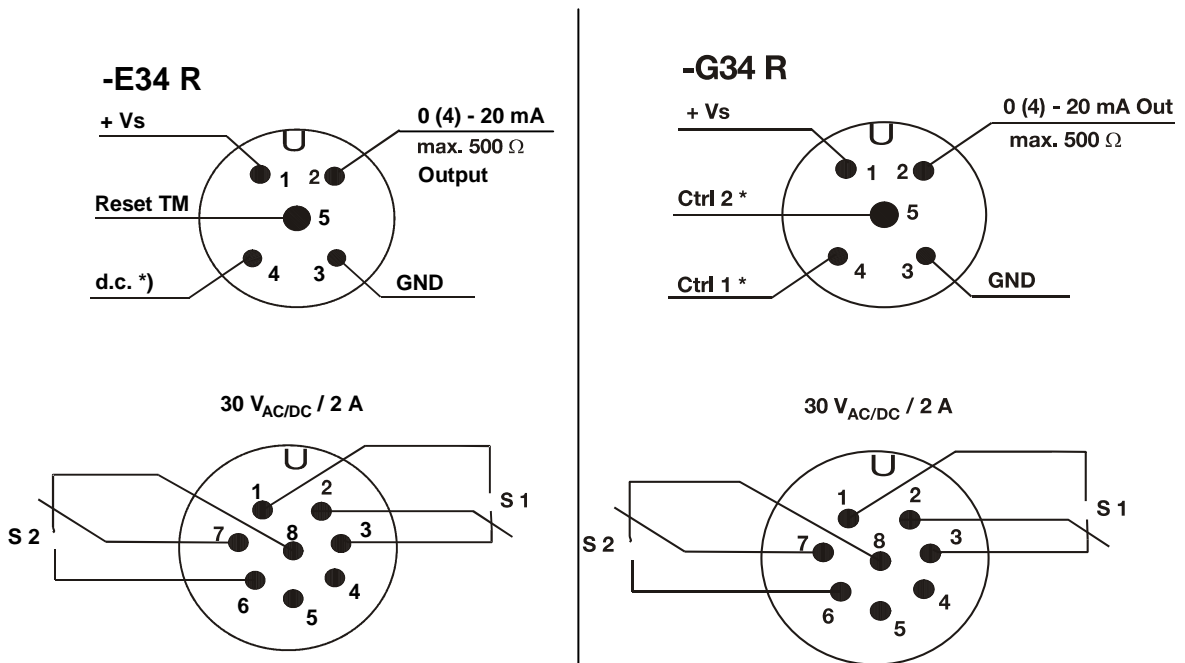
Stop-dosing: Control 2 connect with GND

Reset-dosing: Control 1 and Control 2 at the same time with GND



Do not connect any external voltage to the control units!

Plug connection



d.c. *) Don't connect!

8. Operation

The units are preset and after electrical connection ready for operation.

8.1 Switch point setting DVZ-...S300, DVZ-...S30D

Switch setting	Switch point
0	switch function deactivated
1	start of measuring range
2	20% of f.s.
3	30% of f.s.
4	40% of f.s.
5	50% of f.s.
6	60% of f.s.
7	70% of f.s.
8	80% of f.s.
9	90% of f.s.

Flow above switch point: DUO-LED green

Flow below switch point: DUO-LED red

Measuring range overflow: DUO-LED orange flashing

8.2 Counter electronics DVZ-...Ex4R

Operating please see Operating Instructions ZED-Z

8.3 Dosing electronics DVZ-...Gx4R


Operating please see Operating Instructions ZED-D


9. Adjustments – Compact Electronic DVZ-...C3..

Connect the compact electronic according to previous connection diagram. After power on, the measuring range (end current) will be shown for 3 seconds.


9.1 Button function


In the normal mode (measuring mode)

 : Press 3 sec. → Setup mode


 : Switch point/Window point

In the set-up mode

 : Next Step

 : Change Value

Any time

3 sec 

or do not press
a button for 20 sec

↓

Standard mode

9.2 Settings

The following values can be changed in the compact electronics:

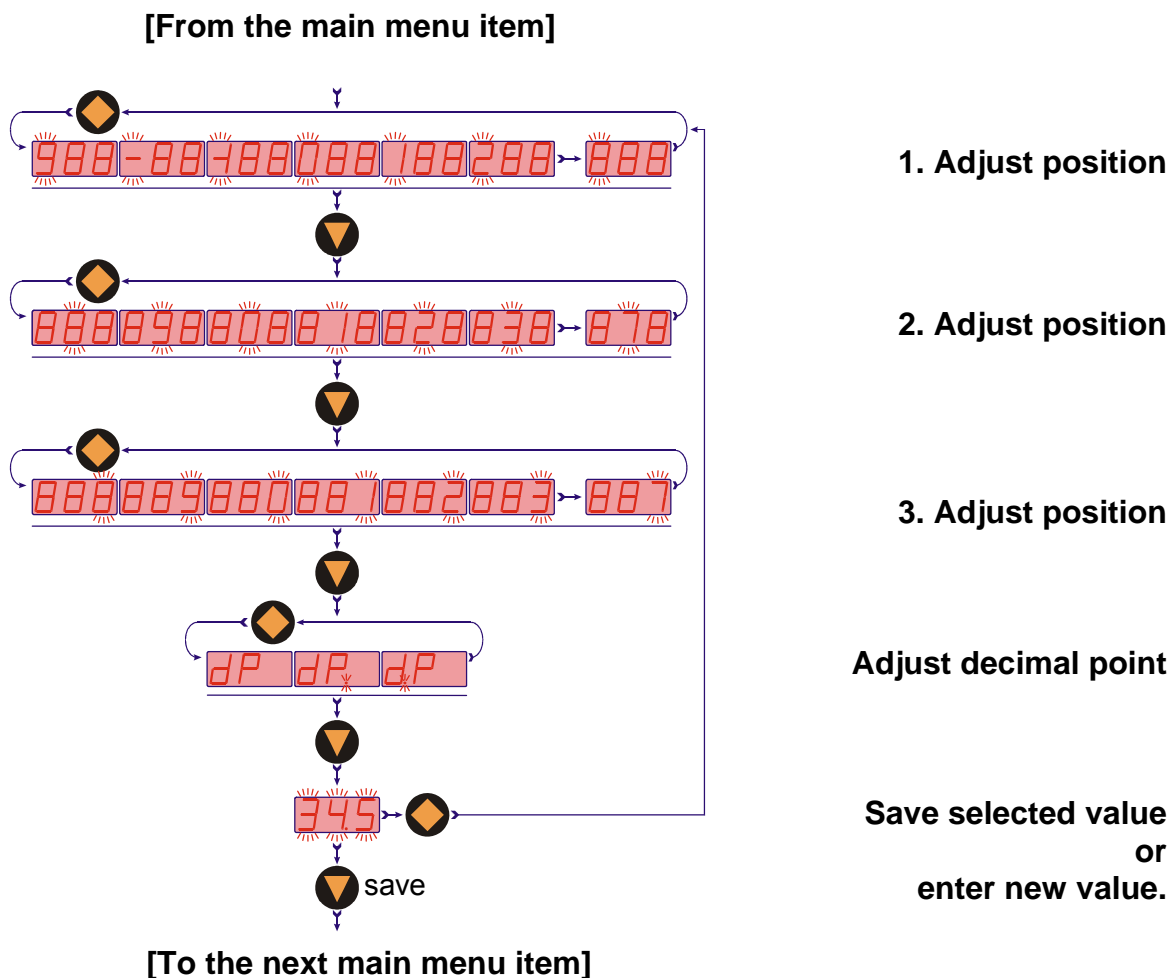
	Scale range	Factory setting
Switch point (SPo , SP1 , SP2)	0...999	0,00
Hysteresis (HYS)	-199...0	-0,00
Window point (duo point) (duo)	Switch point ...999	--- (inactive)
contact-type (Con , Co1 , Co2)	N/O, N/C or Frequency (Fr)**	N/O
Start current (S-C)*	000...999	000
End current (E-C)*	000...999	f.s.
Start current selection (SCS)	0-- (0 mA), 4-- (4 mA)	4 mA
Change Code (CCo)	000...999	000

* Start- and end value of flow relating to 0/4-20 mA.

** **not calibrated**, frequency at f.s. approx. 500 -600Hz

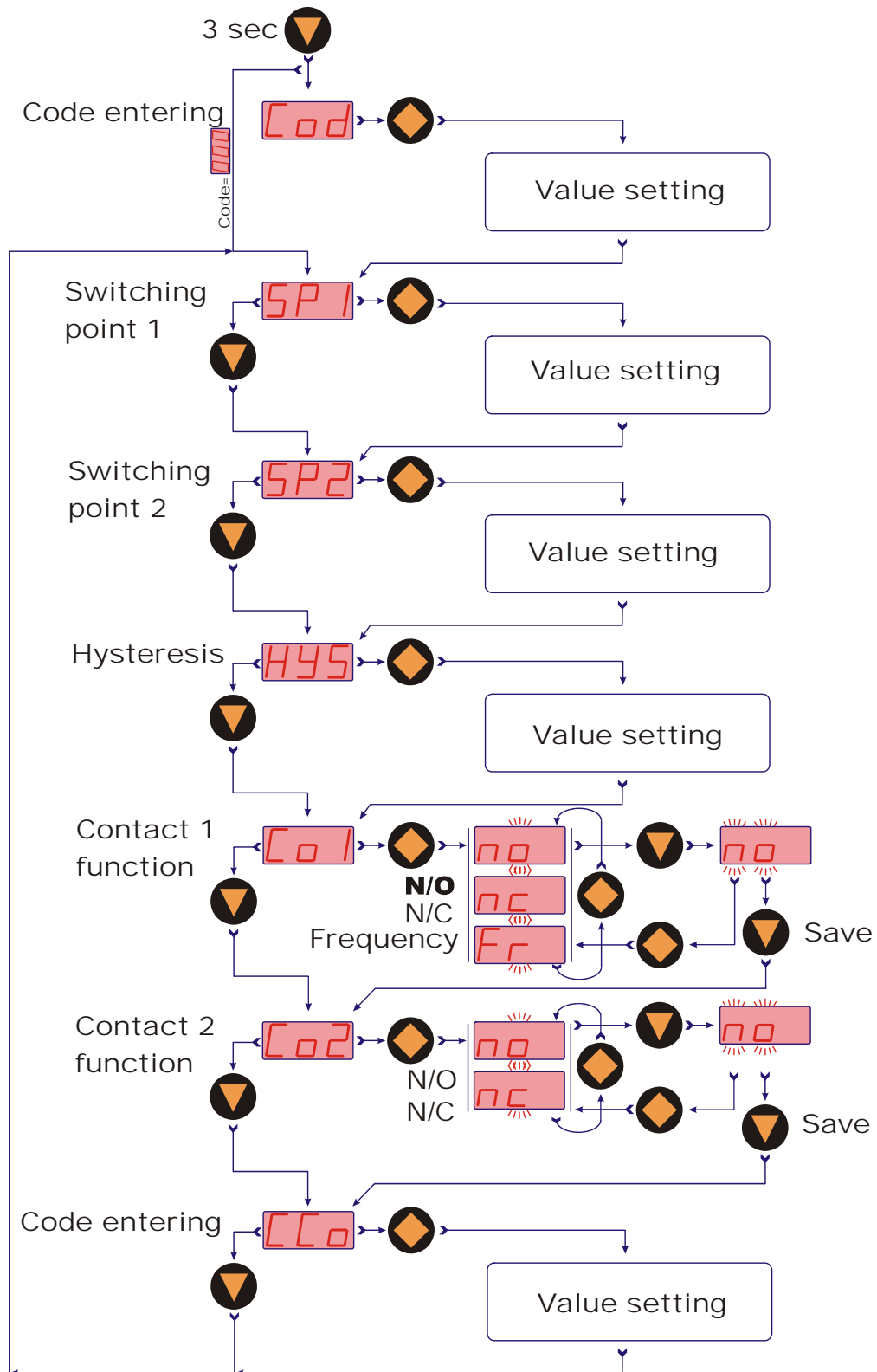
9.3 Value setting

From the main menu item (for example: switch point, "SPo"), press the "◆" button to set the value. The flow chart below illustrates the universal routine for changing individual parameters.

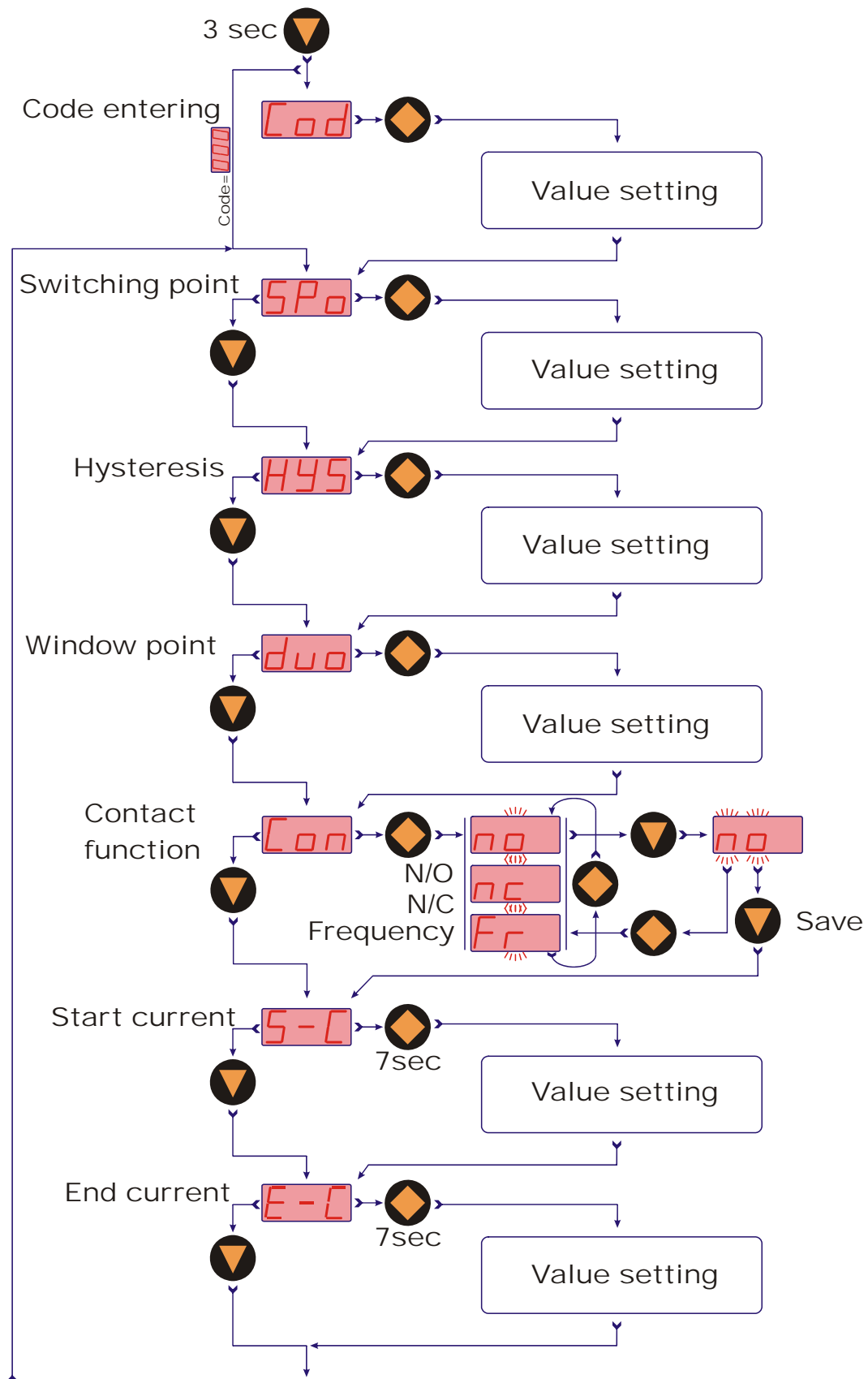


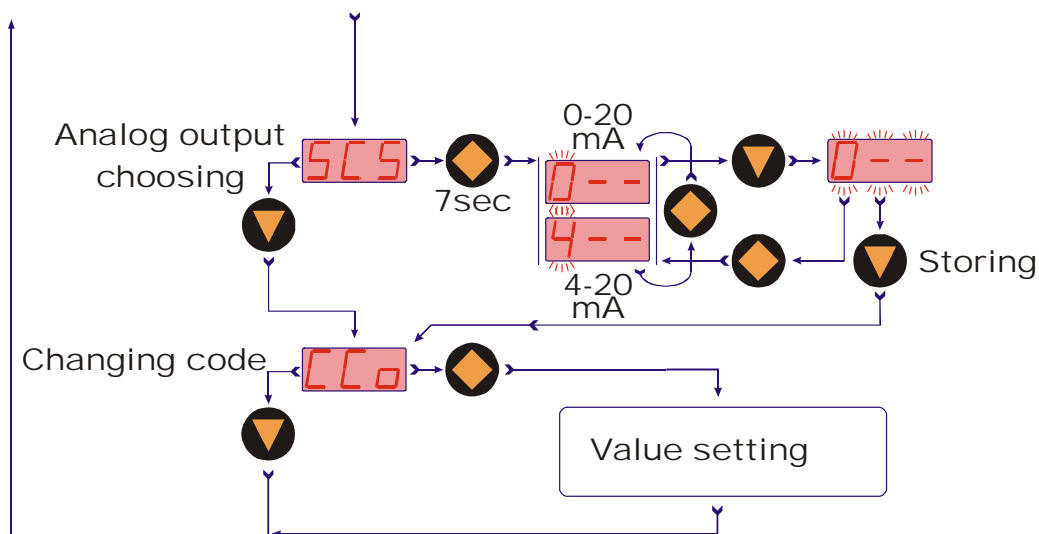
9.4 Set-up mode

Compact electronic DVZ-...C30..



Compact electronic DVZ-...C34





9.5 Main menu items

9.5.1 Switching point

The switching point is entered in the menu item "**Sp_o, SP1, SP2**". A setting value between 000 and 999 can be selected. This value can also include a decimal point. The decimal point can be set at two points (e.g. 10.0 or 1.00). If the display value exceeds the set switch point, the electronic is activated and is signalled by a lightning LED.

If the hysteresis is equal to zero and the window point is de-activated, the electronic switches back whenever the indicated value falls below the switching point.

9.5.2 Hysteresis

After the setting of the switching point, the hysteresis can be entered as a negative value in the "**HYS**" menu. The standard hysteresis value is zero. In operation condition this can lead to ambiguous switching behaviour, if the reading fluctuates around the switching point or window point. In this case, increasing the hysteresis can put things right. The hysteresis relates to the switching point and the window point (switching point minus hysteresis; window point plus hysteresis).

Example: Switching point 100 l/min; Hysteresis: -2.5 l/min

The electronic switches when 100 l/min is exceeded and switches back when the reading drops below 97.5 l/min.

9.5.3 Window point (duo-point)

As well as the switching point, it is also to define a "**duo**" (duo-point), the window point. This must be higher than the switching point. By using the window point and the switching point it is possible to monitor the measurement value in a certain range. The switching point limits the measurement range to smaller values and the window point to larger values.



If the window point (duo-point) is less than or equal to the switching point, an error report (Er4) will be indicated on the display and its value is deleted and its function is invalid (in the case that the window point and switching point out of adjustment).

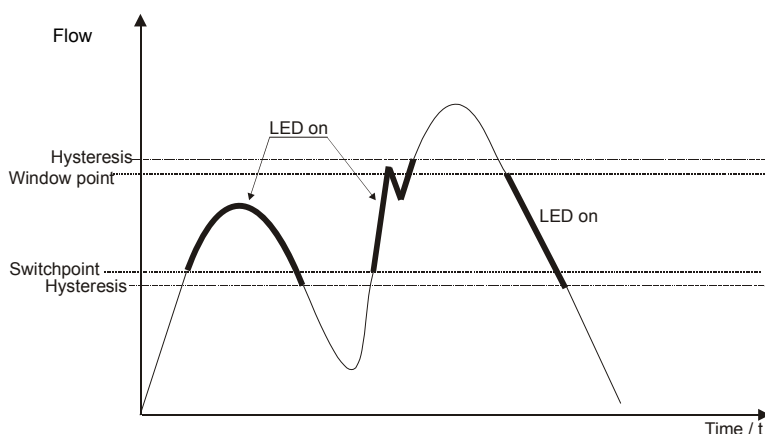
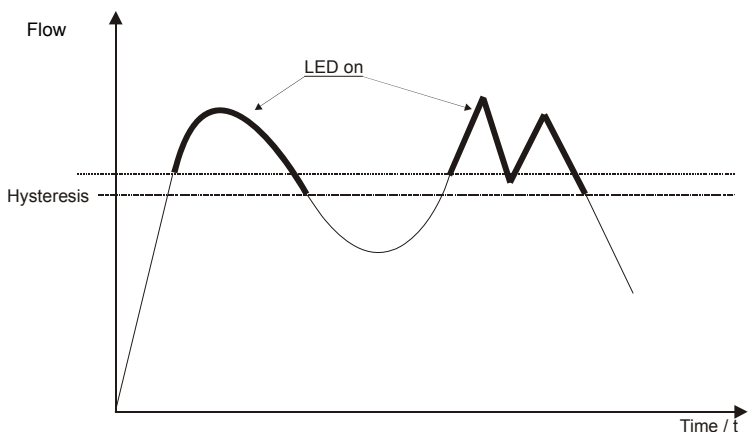
The value is set in the same way as the switching point. The window point is needed for process, in which monitoring of a certain temperature range is necessary.

Example: Switching point: 100 L/min; window point: 150 L/min; hysteresis: -1 L/min

The electronic switches when 100 l/min is exceeded. If the switching value remains between 99 L/min (100-1) and 151 L/min (150+1), the contact will also remain in active switching condition (LED on). If it exceeds 151 l/min or is below 99 l/min the electronic switches back.

Switching behaviour

The following diagram clarifies the switching behaviour of the electronic switch. The contact closes (contact type: no) when it drops below the switching point or the window point. It only opens again if the window point plus hysteresis is exceeded or if it drops below the switching point minus hysteresis. An **LED** indicates the switching condition of the switching point.



9.5.4 Contact type

The function of the transistor switching output is set in menu item "**Con, Co1 or Co2**". The switching function switches from

no - N/O contact to
nc - N/C to
Fr – frequency (only Con and Co1)
and back.

N/O contact: contact closes when switching point is exceeded

N/C contact: contact opens when switching point is exceeded

Frequency: frequency output synchronised with the vane frequency

9.5.5 Current output

The current output is selected in menu items

"S-C" Start current indicated value < > 0(4) mA

"E-C" End current indicated value < > 20 mA

"SCS" Start current selection (0-20 mA or 4-20 mA).

The indicated value at which 0(4) mA flow is entered in menu item Start current.

The indicated value at which 20 mA flow is entered in menu item End current.

9.5.6 Change Code

The change code option "**CCo**" secures the unit against unauthorised tampering. If the code is different from 000, the user must input the code immediately after entering the adjustment mode.

10. Maintenance

The measurement device requires no maintenance if the measurement medium does not cause deposits or include fibre parts, which wrap around the sensor or the gate. In order to avoid problems, we recommend the installation of a filter, such as the magnetic filter, type MFR.

If it is necessary to clean the sensor, the sensor can be rinsed with a suitable liquid. Fiber parts or large particles can be carefully removed with tweezers, etc.



Ensure that the sensor is not damaged.

Work on the electronics can only be performed by the factory, or the warranty is otherwise voided.

11. Technical Information

Measurement process:	Vortex principle
Mounting position:	any, flow in direction of arrow
Response time:	1 s (at flow changes >10% f.s.)
Accuracy:	±2.5% of f.s.
Repeat accuracy:	±1% of f.s.
Inlet / outlet runs:	10xDN
Protection:	IP 65
Media temperature:	0...80 °C
Ambient temperature:	-10...+60 °C

Max. Pressure

Connection	fixed	rotatable
Standard version	10 bar	20 bar
Reinforced version	20 bar	-

Pressure loss

Model	Upper range value	Pressure loss
DVZ-**04	4,5 L/min	420 mbar
DVZ-**07	6,5 L/min	650 mbar
DVZ-**10	10,0 L/min	780 mbar
DVZ-**16	16,0 L/min	600 mbar
DVZ-**22	22,0 L/min	450 mbar
DVZ-**32	32,0 L/min	370 mbar
DVZ-**40	40,0 L/min	450 mbar
DVZ-**50	50,0 L/min	400 mbar
DVZ-**63	63,0 L/min	380 mbar
DVZ-**80	80,0 L/min	400 mbar
DVZ-**99	100,0 L/min	350 mbar

Weight - Sensor

Measuring range	Size	Connection fixed	Connection strengthened	Connection rotatable
bis 32 L/min	¼", 3/8", ½"	approx. 450 g	approx. 600 g	approx. 800 g
bis 32 L/min	¾"	approx. 600 g	approx. 600 g	approx. 900 g
bis 32 L/min	1"	approx. 1050 g	approx. 950 g	approx. 950 g
40...100 L/min	¾"	approx. 1050 g	approx. 1300 g	approx. 1350 g
40...100 L/min	1"	approx. 900 g	approx. 1150 g	approx. 1400 g

Weight - Electronics

Model	Weight
DVZ-...F3x0 DVZ-...S30x DVZ-...Lxx3	approx. 80 g
DVZ-...C3xx	approx. 300 g
DVZ-...Exxx DVZ-...Gxxx	approx. 250 g

Total weight = weight sensor + weight electronics

Wetted parts

Sensor housing:	PPS, fibreglass-reinforced
Sensor:	PVDF
Connections:	brass (from 32 L/min nickel plated from 40 L/min blank) or stainless steel 1.4404
Bluff body:	PPS, fibreglass-reinforced or oxide ceramic (non-wear version)
Seal:	NBR, EPDM or FPM

DVZ-...S300, DVZ-...S30D

Display:	duo-LED for switching condition and when range limit is exceeded
Switching output:	relay changeover, max. 1 A/30 V _{DC} or active 24 V _{DC} , N/C / N/O
Switch point:	measuring range beginning from 90% f.s. in 10%-steps can be configured by the customer using a rotary switch
Power supply:	24 V _{DC} ± 20%
Power consumption:	25 mA
Electrical connection:	plug M12x1.5 pole
Measuring range overflow:	flash of the DUO-LED (red/green) from 105 % of f.s.

DVZ-...F300, DVZ-...F390

Impulse output:	PNP, Open Collector, max. 200 mA
Frequency at f.s.	500 Hz (...F300) 50...1000 Hz (F390)
Power supply:	24 V _{DC} ± 20%
Power consumption:	5 mA
Electrical connection:	plug M12x1
Measuring range overflow:	F _{out} approx. 2 kHz from 105 % of f.s.

DVZ-...L303; DVZ-...L343

Output:	0(4)-20 mA, 3-wire
Max. load:	500 Ω
Power supply:	24 V _{DC} ± 20%
Electrical connection:	plug M12x1
Measuring range overflow:	I _{out} approx. 20,5 mA from 103 % of f.s.

DVZ-...L443 (usage with AUF-3000)

Output:	4-20 mA, 3-wire
Max. load:	500 Ω
Power supply:	24 V _{DC} ± 20%
Electrical connection:	plug DIN 43650
Measuring range overflow:	I _{out} approx. 20,5 mA from 103 % of f.s.

DVZ-...C3 (Compact electronics)*

Display:	3-digit LED
Analogue output:	(0)4...20 mA adjustable, max. 500 Ω (only DVZ-...C34*)
Switching output:	1 or 2 Open Collector PNP or NPN, set at factory, max. 300 mA
Contact function:	N/C, N/O, frequency, programmable (frequency output not calibrated, frequency at f.s. approx. 500 -600Hz)
Programming:	with 2 keys
Power supply:	24 V _{DC} \pm 20%, 3-wire
Power consumption:	approx. 100 mA
Electrical connection:	plug M12x1
Measuring range overflow:	display "OF" from 105% of f.s.

DVZ-...Exxx (Counter electronics)*

Display:	LCD, 2x8 digit, illuminated total, part and flow quantities, units selectable
Quantity meter:	8-digit
Analogue output:	(0)4...20 mA adjustable
Load:	max. 500 Ω
Switching output:	2 relays, max. 30 V _{AC/DC} / 2 A / 60 VA
Settings:	via 4 buttons
Functions:	reset, MIN/MAX memory, flow monitor, monitoring for part and total quantity, language
Power supply:	24 V _{DC} \pm 20 %, 3-wire
Power consumption:	approx. 150 mA
Electrical connection:	cable connection or M12-plug

DVZ-...Gxxx (Dosing electronics)*

Display:	LCD, 2x8 digit, illuminated, dosing, total and flow quantity, units selectable
Quantity meter:	8-digit
Dosage:	5-digit
Analogue output:	(0)4...20 mA adjustable
Load:	max. 500 Ω
Switching output:	2 relays, max. 30 V _{AC/DC} / 2 A / 60 VA
Settings:	via 4 buttons
Functions:	dosing (relay S2), start, stop, reset, fine dosing, correction amount, flow switch, total quantity, language
Power supply:	24 VDC \pm 20 %, 3-wire
Power consumption:	approx. 150 mA
Electrical connection:	cable connection or M12-plug

**more technical details see data sheet ZED in the brochure Z2*

12. Order Codes

Fixed connection

Order details (Example: DVZ-1 1 04 G2 S300)

Storage body/ housing	Connection material/seal	Measuring range	Connection fixed	Electronics
DVZ-1.. = PPS DVZ-2.. = ceramic DVZ-3..* = PPS/ strengthened design DVZ-4..* = ceramic/ strengthened design	..1.. = brass/ NBR	..04.. = 0.5 - 4.5 L/min ..07.. = 0.8 - 7.0 L/min ..10.. = 1.3 - 10.0 L/min	..G2.. = G 1/4 ..G3.. = G 3/8 ..G4.. = G 1/2 ..N2.. = 1/4 NPT ..N3.. = 3/8 NPT ..N4.. = 1/2 NPT	switching output ..S300 = relay, M12-plug ..S30D = active 24 VDC, M12-plug frequency output ..F300 = M12-plug, 500 Hz ..F390 = M12-plug, 50...1000 Hz analogue output ..L303 = M12-plug, 0-20 mA ..L343 = M12-plug, 4-20 mA ..L443 = DIN-plug, 4-20 mA compact electronics** ..C30R = 2xOpen Coll. PNP ..C30M = 2xOpen Coll. NPN ..C34P = 4-20 mA, 1xOpen Coll. PNP ..C34N = 4-20 mA, 1xOpen Coll. NPN counter electronics ..E14R = LCD, 0(4)-20 mA, 2xrelay, 1 m cable ..E34R = LCD, 0(4)-20 mA, 2xrelay, M12-plug dosing electronics ..G14R = LCD, 0(4)-20 mA, 2xrelay, 1 m cable ..G34R = LCD, 0(4)-20 mA, 2xrelay, M12-plug
	..2.. = st. steel/ NBR	..16.. = 2.0 - 16.0 L/min	..G3.. = G 3/8 ..G4.. = G 1/2 ..G5.. = G 3/4 ..N3.. = 3/8 NPT ..N4.. = 1/2 NPT ..N5.. = 3/4 NPT	
	..4.. = brass/ EPDM	..22.. = 3.2 - 22.0 L/min ..32.. = 4.0 - 32.0 L/min	..G4.. = G 1/2 ..G5.. = G 3/4 ..G6.. = G 1 ..N4.. = 1/2 NPT ..N5.. = 3/4 NPT ..N6.. = 1 NPT	
	..5.. = st. steel/ EPDM	..40.. = 4,0 - 40,0 L/min ..50.. = 5,0 - 50,0 L/min ..63.. = 6,3 - 63,0 L/min ..80.. = 8,0 - 80,0 L/min ..99.. = 10,0 - 100 L/min	..G5.. = G 3/4 ..G6.. = G 1 ..N5.. = 3/4 NPT ..N6.. = 1 NPT	
	..7.. = brass/ FPM			
..8.. = st. steel/ FPM				

*Reinforced version only in combination with fixed connection

**Please specify flow direction in the order

Axial rotatable connection

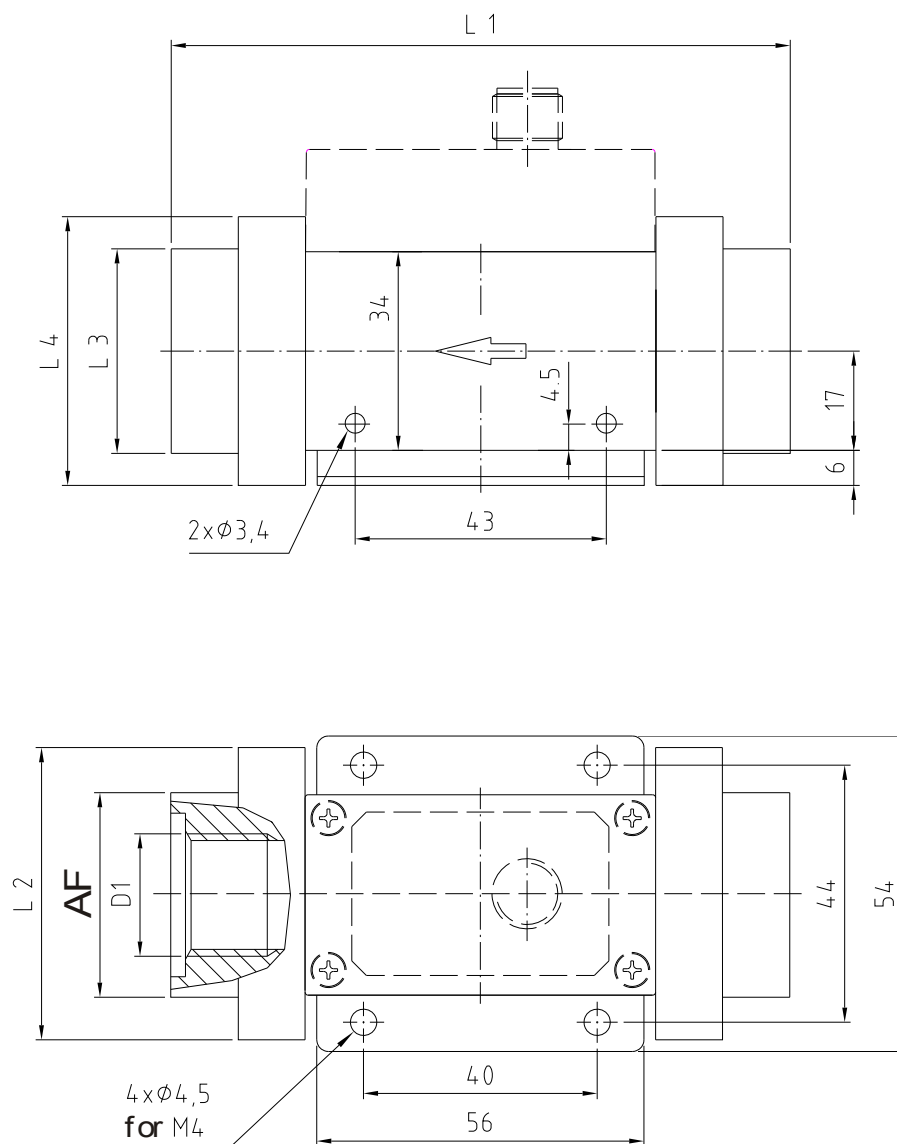
Storage body/ housing	Connection material/ Seal	Measuring range	Connection rotatable	Electronics
DVZ-1.. = PPS DVZ-2.. = ceramic	..1.. = brass/ NBR ..2.. = st. steel/ NBR ..4.. = brass/ EPDM ..5.. = st. steel/ EPDM ..7.. = brass/ FPM ..8.. = st. steel/ FPM	..04.. = 0.5 - 4.5 L/min ..07.. = 0.8 - 7.0 L/min ..10.. = 1.3 - 10.0 L/min	..B2.. = G 1/4 ..B3.. = G 3/8 ..B4.. = G 1/2 ..P2.. = 1/4 NPT ..P3.. = 3/8 NPT ..P4.. = 1/2 NPT	switching output ..S300 = relay, M12-plug ..S30D = active 24 VDC, M12-plug frequency output ..F300 = M12-plug, 500 Hz ..F390 = M12-plug, 50...1000 Hz analogue output ..L303 = M12-plug, 0-20 mA ..L343 = M12-plug, 4-20 mA ..L443 = DIN-plug, 4-20 mA compact electronics* ..C30R = 2xOpen Coll. PNP ..C30M = 2xOpen Coll. NPN ..C34P = 4-20 mA, 1xOpen Coll. PNP ..C34N = 4-20 mA, 1xOpen Coll. NPN counter electronics ..E14R = LCD, 0(4)-20 mA, 2xrelay, 1 m cable ..E34R = LCD, 0(4)-20 mA, 2xrelay, M12-plug dosing electronics ..G14R = LCD, 0(4)-20 mA, 2xrelay, 1 m cable ..G34R = LCD, 0(4)-20 mA, 2xrelay, M12-plug
		..16.. = 2.0 - 16.0 L/min	..B3.. = G 3/8 ..B4.. = G 1/2 ..B5.. = G 3/4 ..P3.. = 3/8 NPT ..P4.. = 1/2 NPT ..P5.. = 3/4 NPT	
		..22.. = 3.2 - 22.0 L/min ..32.. = 4.0 - 32.0 L/min	..B4.. = G 1/2 ..B5.. = G 3/4 ..B6.. = G 1 ..P4.. = 1/2 NPT ..P5.. = 3/4 NPT ..P6.. = 1 NPT	
		..40.. = 4.0 - 40.0 L/min ..50.. = 5.0 - 50.0 L/min ..63.. = 6.3 - 63.0 L/min ..80.. = 8.0 - 80.0 L/min ..99.. = 10.0 - 100 L/min	..B5.. = G 3/4 ..B6.. = G 1 ..P5.. = 3/4 NPT ..P6.. = 1 NPT	

*Please specify flow direction in the order

13. Dimensions

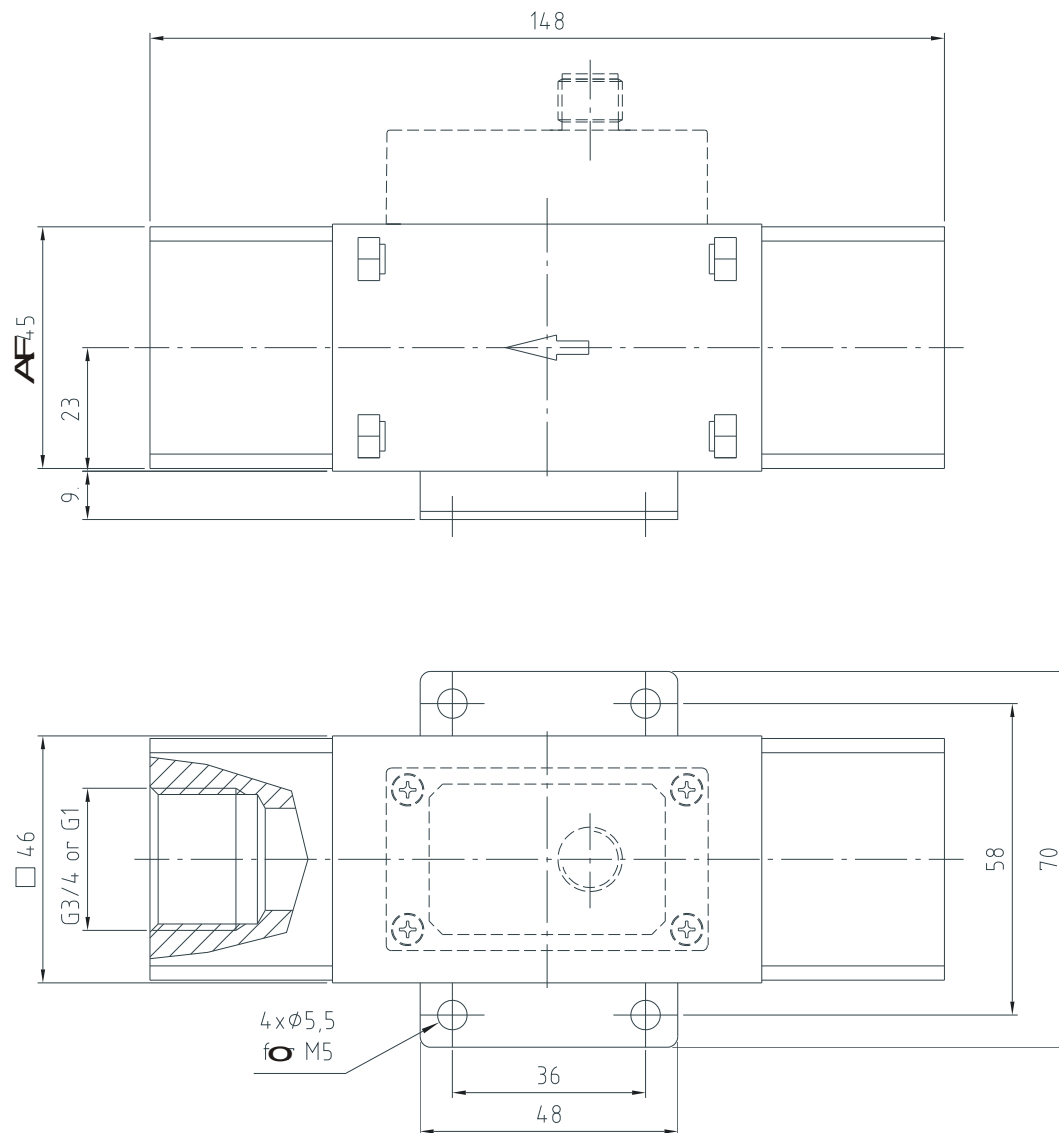
13.1 Dimensions - Sensor

DVZ-sensor with fixed connection, measuring range up to 32 L/min

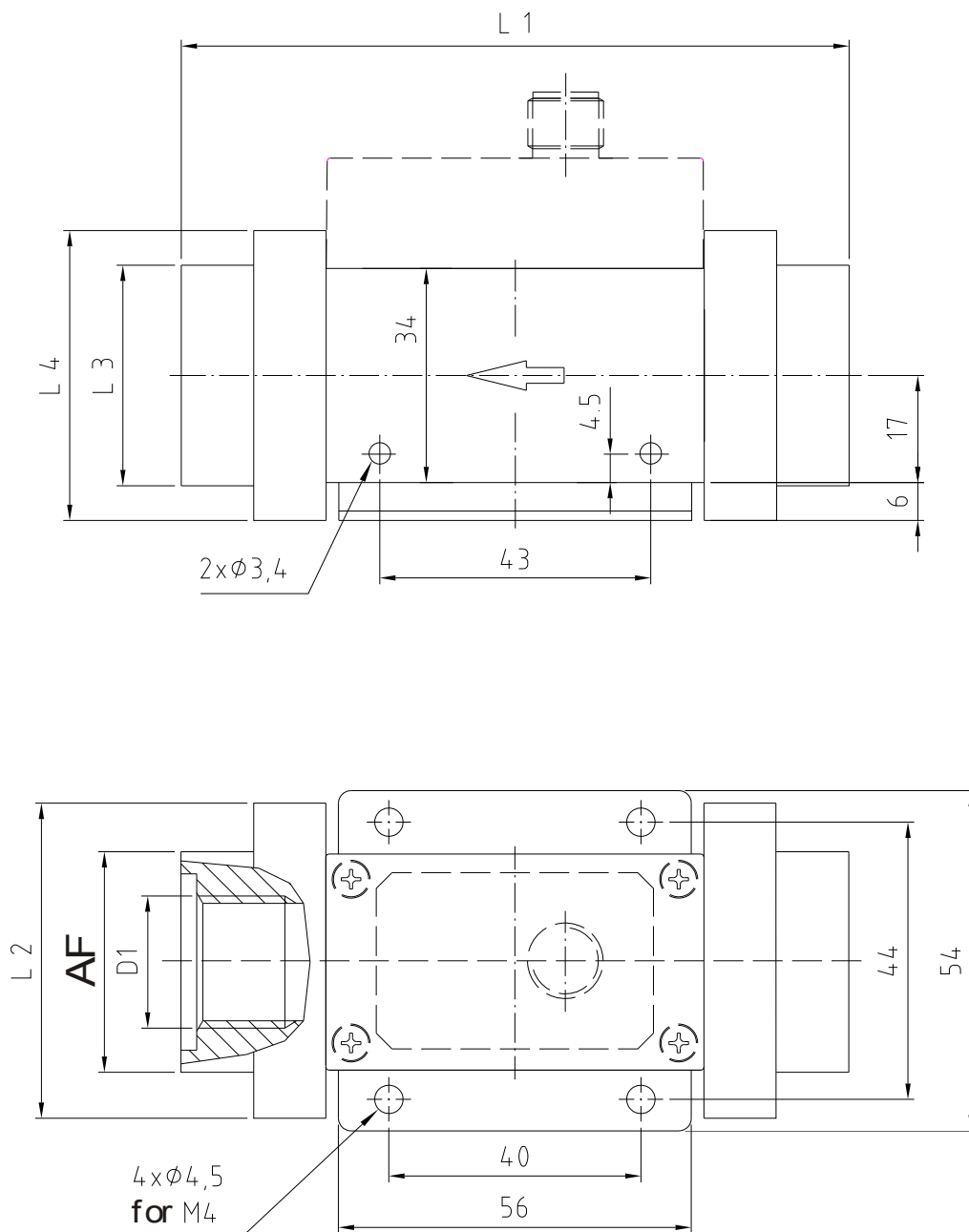


Meas. range	..04/..07/..10	..04/..07/..10/..16	..04/..07/..10/..16/..22/..32	..16/..22/..32	..22/..32
D 1	1/4"	3/8"	1/2"	3/4"	1"
AF	35	35	35	34	--
L 1	100	100	106	120	128
L 2	--	--	--	50	50
L 3	35	35	35	34	--
L 4	--	--	--	--	46

DVZ-sensor with fixed connection,
measuring range from 40 L/min

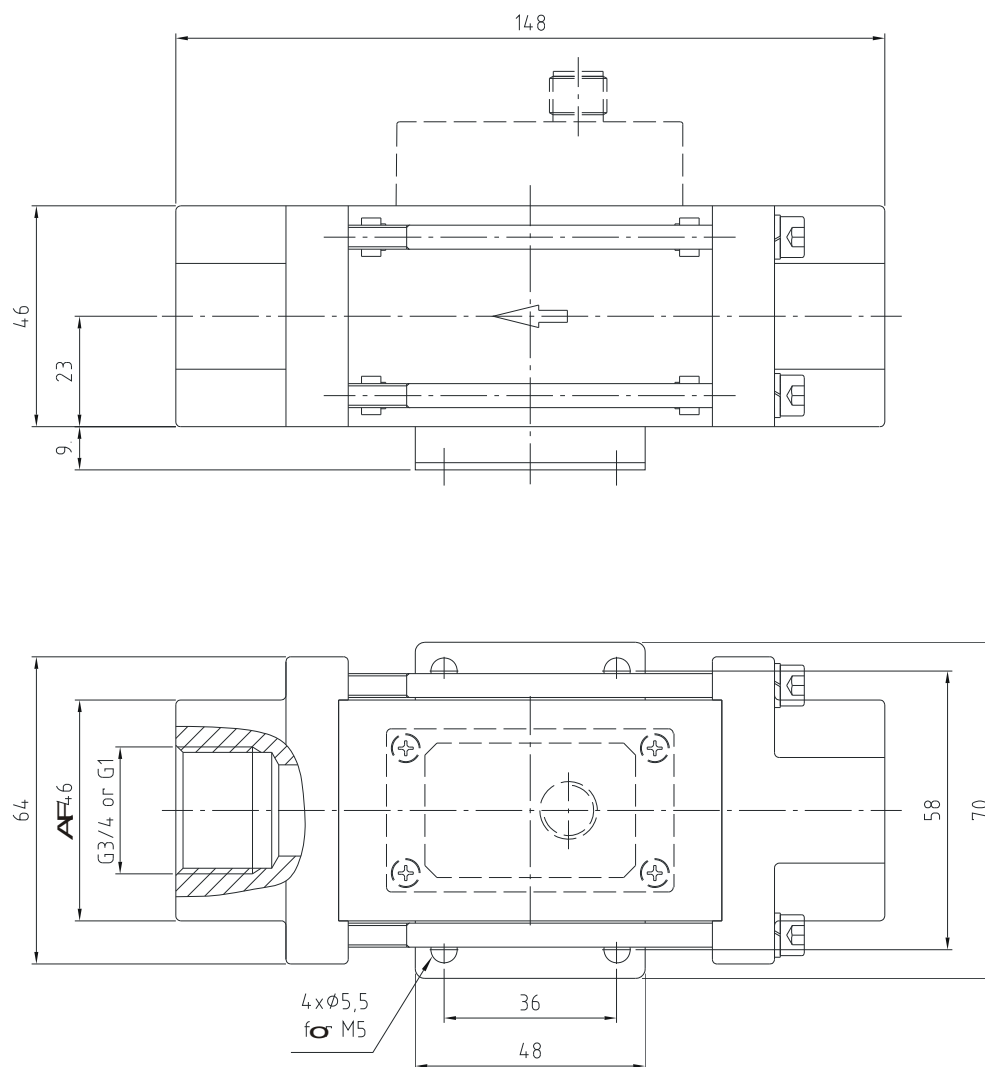


DVZ-sensor with strengthened connection,
measuring range up to 32 L/min

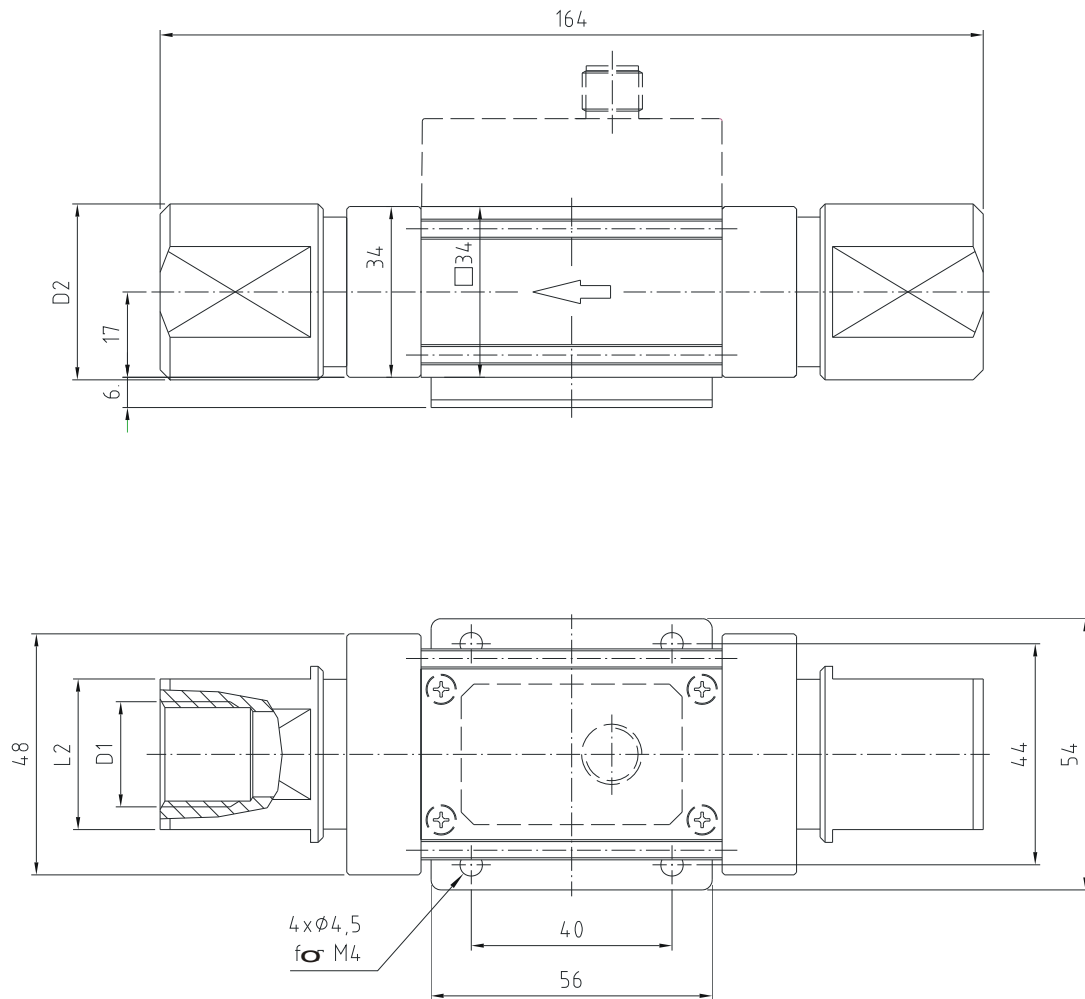


Meas. range	..04/..07/..10	..04/..07/..10/..16	..04/..07/..10/..16/..22/..32	..16/..22/..32	..22/..32
D 1	1/4"	3/8"	1/2"	3/4"	1"
AF	34	34	34	34	--
L 1	100	100	106	120	128
L 4	34	34	34	34	46

DVZ-sensor with strengthened connection,
measuring range from 40 L/min

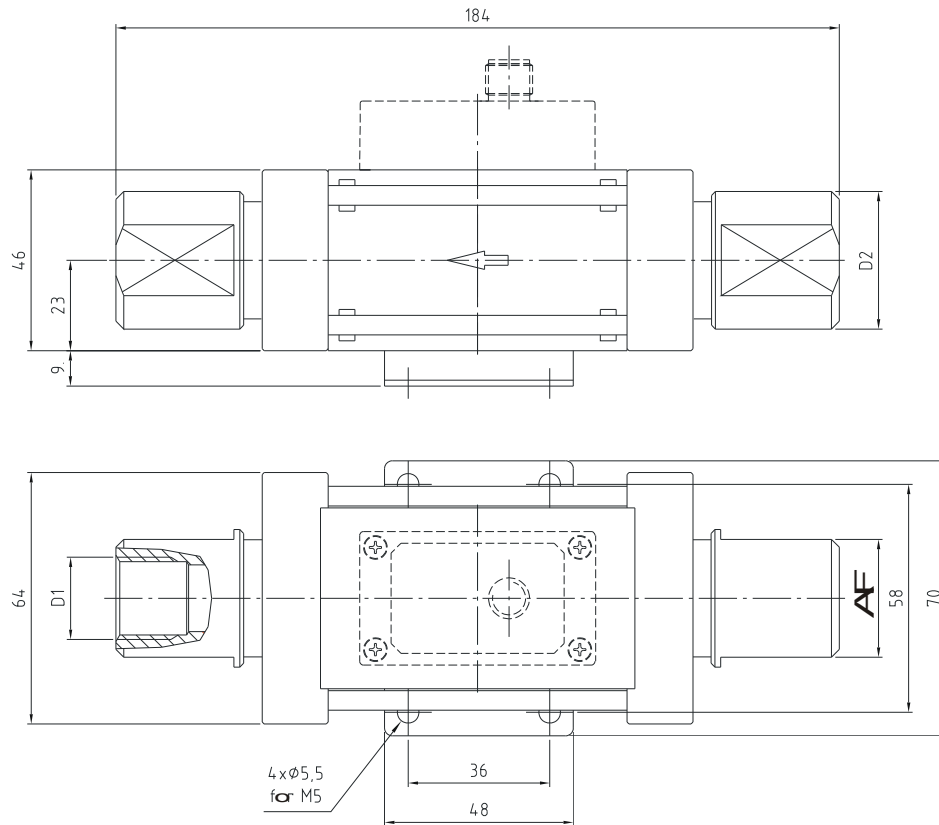


DVZ-Sensor with rotatable connection,
measuring range up to 32 L/min



Meas. range	..04/..07/..10	..04/..07/..10/..16	..04/..07/..10/..16/..22/..32	..16/..22/..32	..22/..32
D 1	1/4"	3/8"	1/2"	3/4"	1"
D 2	24	28	35	40	45
AF	19	24	30	36	41

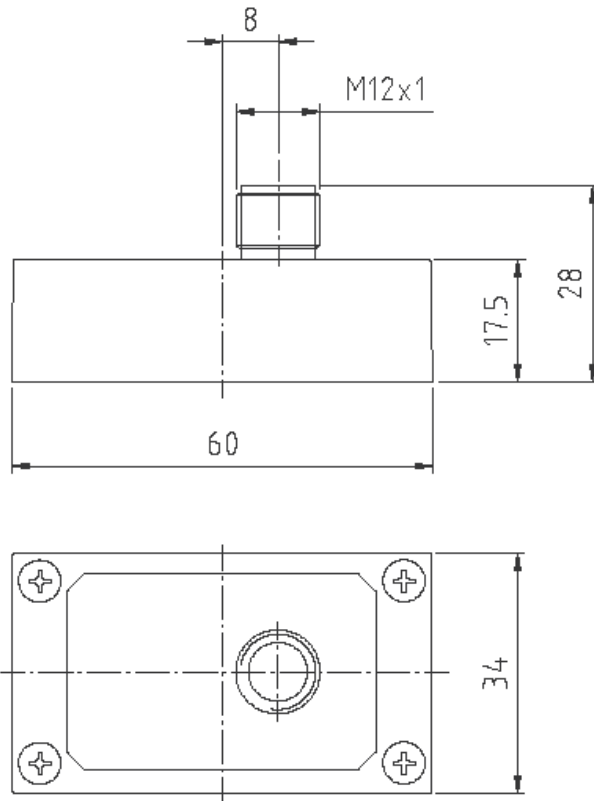
DVZ-Sensor with rotatable connection, measuring range from 40 L/min



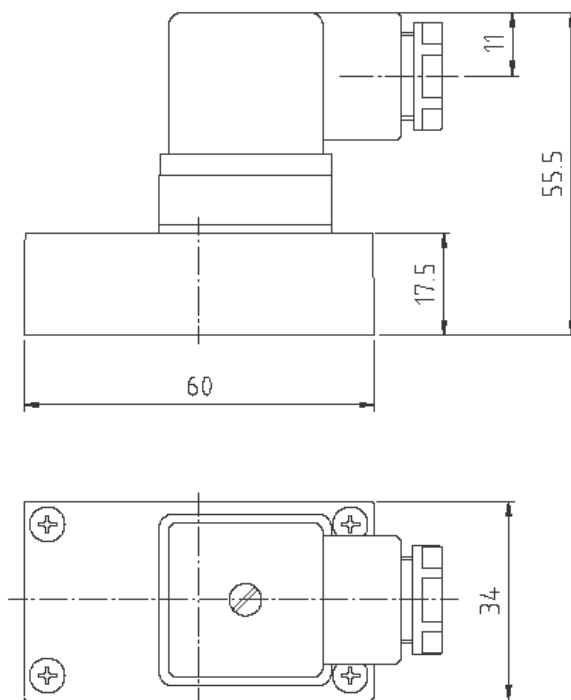
Meas. range	..40/..50/ ..60/..80/ ..99	..40/..50/ ..60/..80/ ..99
D 1	3/4"	1"
D 2	40	45
AF	36	41

13.2 Dimensions - Electronics

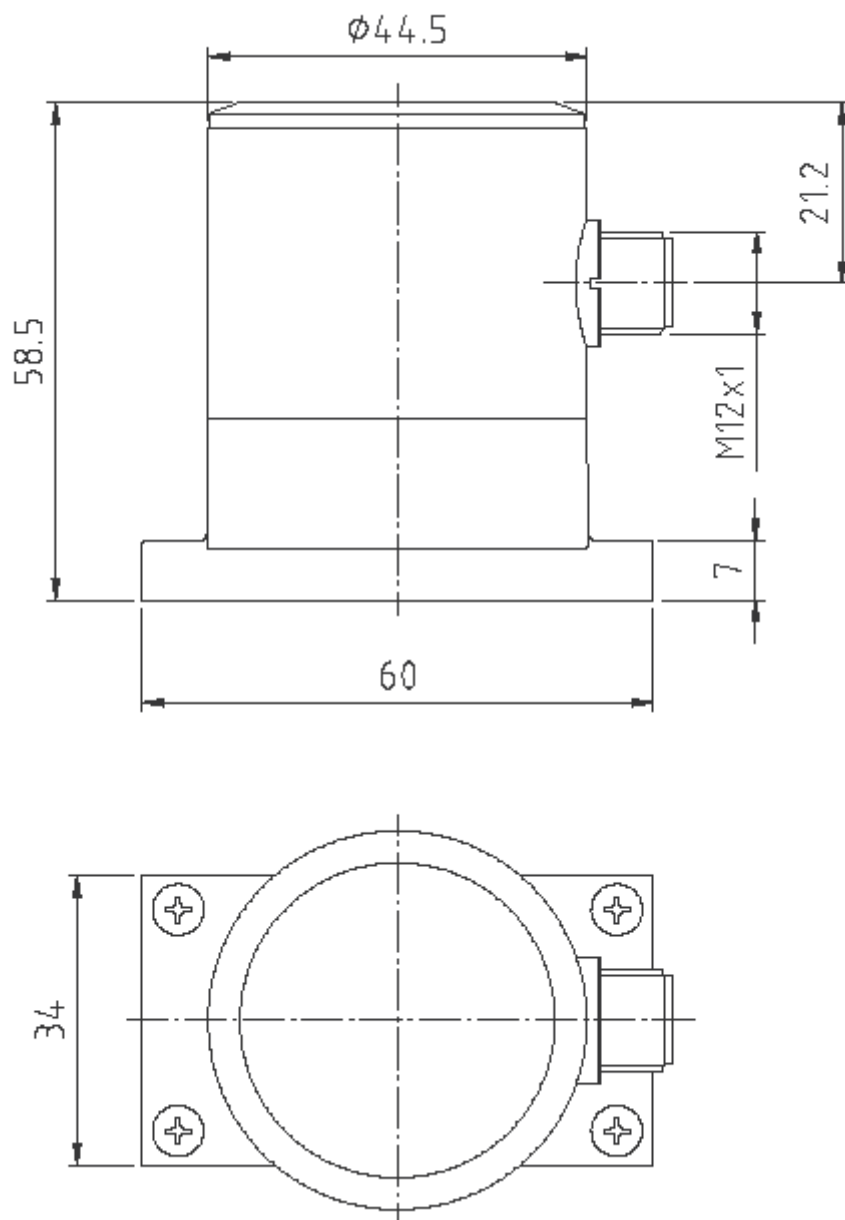
DVZ-...S30x, DVZ-...F3x0, DVZ-...L3x3



DVZ-...L443

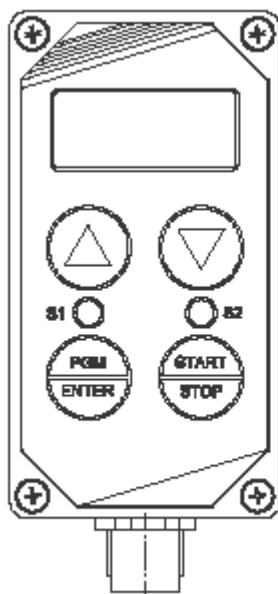
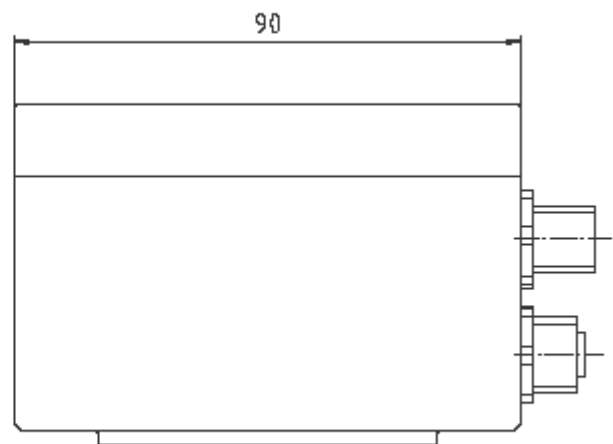
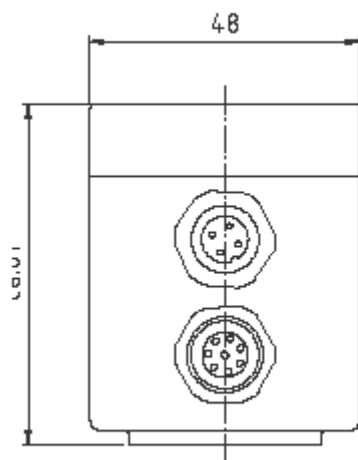


DVZ-...C3xx



DVZ

DVZ-...Exxx, DVZ-...Gxxx



14. EU Declaration of Conformity

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Compact Vortex Flow Meter Model: DVZ

to which this declaration relates is in conformity with the standards noted below:

EN 61326-1:2013

Electrical equipment for control and instrumentation technology and laboratory use – EMC-requirements Part 1: General requirements

EN 61010-1:2011

Safety requirements for electrical measuring-, control- and laboratory instruments

EN 60529:2014

Degrees of protection provided by enclosures (IP Code)

Also the following EEC guidelines are fulfilled:

2014/30/EU

EMC Directive

2011/65/EU

RoHS



H. Peters
General Manager



M. Wenzel
Proxy Holder

Hofheim, 06. April 2016